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**WHAT IS CLAIMED IS:**

2        1. A method of joining a first metal to a surface of a  
3 second metal at a region susceptible to stress corrosion cracking,  
4 comprising welding said first metal to said surface of said second  
5 metal under conditions of low heat input to achieve reduced  
6 thermal sensitization.

7

8        2. A method according to claim 1 wherein said first  
9 metal is cladding and said second metal is a component of a  
10 nuclear reactor.

11

12        3. A method according to claim 2 wherein said welding  
13 is effected using a welding torch.

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15        4. A method according to claim 3 wherein said welding  
16 torch travels at a speed in excess of 10 inches per minute.

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18        5. A method according to claim 3 wherein said welding  
19 torch travels at a speed of 15 to 30 inches per minute.

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21        6. A method according to claim 1 wherein said heat  
22 input is less than 1.5 kJoules per cm.

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24        7. A method according to claim 6 wherein said heat  
25 input is in the range of 0.5 to 1.0 kJoules per cm.

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27        8.    A method according to claim 1 wherein said welding  
28    is carried out using a filler material.

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30        9.    A method according to claim 8 wherein said filler  
31    material comprises a noble metal.

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33        10.   A method according to claim 9 wherein said noble  
34    metal is selected from the group consisting of palladium,  
35    platinum, rhodium and combinations thereof.

36

37        11.   A method according to claim 9 wherein said noble  
38    metal is present in said filler material in an amount of 1% by  
39    weight or less.

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41        12.   A method according to claim 9 wherein said noble  
42    metal is present in said filler material an amount of about 0.25 to  
43    0.75 % by weight.

44

45        13.   A method according to claim 1 wherein said welding  
46    is carried out over a period of time such that such that the metal  
47    temperature during weld cooling is insufficient to allow carbide  
48    formation on grain boundaries.

49

50        14.   A method according to claim 1 wherein said welding  
51    is carried out over a period of time in the sensitizing range such  
52    that such that the metal temperature during weld cooling is  
53    insufficient to allow carbide formation on grain boundaries.

54

55        15.    A method according to claim 1 wherein said welding  
56    is carried out over a period of time to form a fine microstructure of  
57    Delta Ferrite.

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59        16.    A method of joining a first metal to a surface of a  
60    second metal at a region susceptible to stress corrosion cracking,  
61    comprising welding said first metal to said second metal under  
62    conditions of low heat input to achieve reduced residual stress on  
63    said surface and near surface.

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65        17.    A method according to claim 13, wherein said first  
66    metal has a far surface which is water cooled.

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68        18.    A method according to claim 13, wherein said first  
69    metal has a far surface which is air cooled.

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71        19.    A method according to claim 13, wherein said first  
72    metal has a far surface which exhibits reduced residual stress.

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74        20.    A method according to claim 13, wherein said first  
75    metal has a near surface which exhibits reduced residual stress.

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77        21.    A method according to claim 13, wherein said first  
78    metal is adjacent to a near surface of said second metal.

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A2 80 22. A method according to claim 13, wherein said second  
Cord 81 metal is adjacent to a near surface of said first metal.